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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/591,617

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Noboru Sakimura

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EXAMINER

HUR, JUNG H

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/591,617

Applicant(s)

SAKIMURA ET AL.

Examiner

Jung (John) H. Hur

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1 and 2 is/are rejected.
- 7) ☒ Claim(s) 3-14 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 November 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 10/23/06
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____
- ☐ Notice of Informal Patent Application
- ☒ Other: search history

DETAILED ACTION

1. Claims 1-14 are pending in the application.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. **Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. Appl. Pub. No. 2004/0004856 ("SAKIMURA") in view of U.S. Pat. No. 6,545,906 ("SAVTCHENKO").**

Regarding claim 1, SAKIMURA discloses a magnetoresistive random access memory (for example, Fig. 17) comprising: a plurality of first wirings (13) which is extended in a first direction (horizontal, in Fig. 17); a plurality of second wirings (74 and 76) which is extended in a second direction (vertical, in Fig. 17) which is substantially perpendicular to said first direction (see Fig. 17); a plurality of memory cells (72 and 75), each of which is placed correspondingly to each of positions where said plurality of first wirings is crossed with said plurality of second wirings (see Fig. 17); a second sense amplifier (85) which detects a state of a reference cell (for example, 75a) on the basis of an output from said reference cell (75a) provided by corresponding to a reference wiring (76) among said plurality of second wirings (74 and 76), among said plurality of memory cells (72 and 75); and a first sense amplifier (86) which detects a state of one (for example, 72a) of said plurality of memory cells (72 and 75) on the basis of an output

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(via 85) from said reference cell (75a) and an output (via 84) from said one (72a) of the plurality of memory cells, which is different from said reference cell (see Fig. 17), wherein each of said plurality of memory cells includes a magnetic tunneling junction element having a laminated free layer (i.e., a thin film of free layer; see Figs. 5A and 5B, as applied to Fig. 17) in which a magnetization direction is reversed correspondingly to data to be stored (see Figs. 5A and 5B).

SAKIMURA does not disclose that said magnetic tunneling junction element has a magnetization easy axis direction which is different from said first and second directions.

SAVTCHENKO discloses a magnetic tunneling junction element (for example, Figs. 1 and 2) having a magnetization easy axis direction (a diagonal direction of 53, 57 and 40 in Fig. 2) which is different from first and second directions (the direction of 20 and 30 in Fig. 2).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to use the magnetic tunneling junction elements of SAVTCHENKO in the memory of SAKIMURA, with appropriate changes to the peripheral circuit, for the purpose of enabling a new and improved means of writing to an MRAM device which is highly selectable, with an improved error rate and with a switching field that is less dependent on shape (see for example SAVTCHENKO column 2, lines 6-16).

Regarding claim 2, the above combination further discloses that a toggle operation (see for example Fig. 4 of SAVTCHENKO, as applied to the above combination) to reverse a magnetization of said laminated free layer, for a selected cell (for example, 72a in Fig. 17 of SAKIMURA, as applied to the above combination) as one of plurality of memory cells which corresponds to a selected first wiring selected among said plurality of first wirings and a selected

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second wiring selected among said plurality of second wirings, is executed by a series of current controls in which a first write current (IW 60, in Figs. 2 and 4 of SAVTCHENKO, as applied to the above combination) is supplied to said selected first wiring followed by a second write current (ID 70, in Figs. 2 and 4 of SAVTCHENKO, as applied to the above combination) to be supplied to said selected second wiring next, then, said first write current is stopped followed by said second write current to be stopped (see Fig. 4 of SAVTCHENKO, as applied to the above combination).

Allowable Subject Matter

4. Claims 3-14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 3, the prior arts of record do not disclose or suggest a magnetoresistive random access memory as recited in claim 3 *in toto* and particularly, in conjunction with other limitations, said first write current and said second write current are larger in said toggle operation executed for said reference cell than in said toggle operation executed for one of said plurality of memory cells which is different from said reference cell.

Regarding claim 4, the prior arts of record do not disclose or suggest a magnetoresistive random access memory as recited in claim 9 *in toto* and particularly, in conjunction with other limitations, a stored information of said reference cell is read out by executing a first read-out operation to detect a first state as an initial state of said reference cell, a first toggle operation to

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bring said reference cell into a second state by said toggle operation, a second read-out operation to detect said second state of said reference cell, and a second toggle operation to return said reference cell to said first state by said toggle operation, thereby stored information of the reference cell is read out on the basis of a comparison result between said first state and said second state. Claims 9-14 depend on claim 4.

Regarding claim 5, the prior arts of record do not disclose or suggest a magnetoresistive random access memory as recited in claim 5 *in toto* and particularly, in conjunction with other limitations, a first toggle operation to bring said reference cell into a second state by said toggle operation, a second read-out operation to detect said second state of said reference cell, and a determination operation to determine said first state and said second state on the basis of a comparison result between said first state and said second state, thereby said second state is retained if said second state is equal to said stored information to be written to said reference cell, and said toggle operation is executed to return said reference cell to said first state if said second state is different from said stored information to be written to said reference cell, for writing.

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jung (John) H. Hur whose telephone number is (571) 272-1870. The examiner can normally be reached on M-F 8:00 AM - 4:30 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Elms can be reached on (571) 272-1869. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

jhh

/J. H. Hur/
Primary Patent Examiner
Art Unit 2824
09 January 2008